We claim:

Claim 1. Nonagglomerated, ultra fine, engineered Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm with high biological activity.

Claim 2. A method for enhancing the longevity of living cells comprising:

adding nonagglomerated, ultra fine, engineered nanoparticles of Cerium Oxide of the size approximately 2 to approximately 10 nm to cultures of living cells.

Claim 3. A method for promoting wound healing comprising:

introducing implants or surgical dressings coated with an effective amount of nonagglomerated, ultrafine, engineered Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm to injured tissue of a patient.

Claim 4. The method, as in claim 3, wherein said implants further comprise a medically effective amount of a pharmaceutical excipient.

Claim 5. A method for treating arthritis and joint diseases comprising;

introducing a medically effective joint replacement coated with a medically effective amount of nonagglomerated, engineered, ultrafine Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm into the body of a patient suffering from said diseases.

Claim 6. The method, as in claim 5 wherein said Cerium Oxide nanoparticles are

introduced in a pharmaceutically acceptable excipient.

Claim 7. A method for treating vascular diseases comprising the steps of:

coating replacement vascular grafts with nonagglomerated, ultrafine, engineered nanoparticles of Cerium Oxide of the size approximately 2 to approximately 10 nm; and

introducing an effective amount of said graft into a patient requiring such grafts.

Claim 8. The method, as in claim 7, wherein said Cerium Oxide nanoparticles further comprise a pharmaceutically acceptable excipient.

Claim 9. An anti-aging treatment, comprising the steps of:

administering an effective amount of nonagglomerated, ultrafine, engineered Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm to a person desirous of such treatment.

Claim10. The treatment, as in claim 9, wherein said nanoparticles further comprise a pharmaceutically acceptable excipient, and said treatment is administered as an oral composition, an intravenous injection, or an intrathecal delivery..

Claim 11. A method for treating arthritis, joint diseases, stroke, traumatic brain injury or vascular diseases, comprising the steps of:

administering to a patient suffering from one or more of said diseases a medically effective amount of nonagglomerated, ultra fine, engineered Cerium Oxide particles of

the size approximately 2 to approximately 10 nm.

Claim 12. The method, as in claim 11 wherein said nanoparticles further comprise a pharmaceutically acceptable excipient, and said treatment is administered as an oral composition, or an intravenous injection or an intrathecal delivery

Claim 13. A method for treating inflammation comprising the steps of:

administering to a patient in need of an anti-inflammatory, an effective amount of nonaggglomerated, ultra fine, engineered Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm .

Claim 14. The method, as in claim 13, wherein said Cerium Oxide nanoparticles further comprise a pharmaceutically acceptable excipient, and are administered to said patient in an oral composition, intrathecal administration or in an intravenous injection.

Claim15. A composition, comprising:

nonaggglomerated, unltrafine, engineered cerium oxide nanoparticles of the size approximately 2 to approximately 10 nm and a pharmaceutically acceptable excipient.

Claim16 . A method for preparing nonaggglomerated, unltrafine, engineered cerium oxide nanoparticles of the size approximately 2 to approximately 10 nm with high biological activity comprising: a sol microemulsion reverse micelle process.

Claim17. The method, as in claim 16, wherein said reverse micelle process comprises using a non-polar chemical which when mixed with aqueous medium containing Cerium Oxide forms a micro-reaction vessel, forming a shell around the Cerium and permitting the nanoparticles to grow with the surfactant shell.

Claim 18. The method, as in claim 17, wherein the reaction time and solvent composition is varied to produce particles of varying sizes from approximately 2 to approximately 10 nm..

Claim 19. A method, as in claim 18, wherein said reaction time is approximately 30 to approximately 60 minutes.

Claim 20. A method for preparing Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm comprising the steps of:

dissolving approximately 0.5 to approximately 1.0 grams of Ce(NO3)3.6H2O in deionized water to make approximately 10 mls of solution to form a first solution;

dissolving approximately 3 to approximately 4 grams of AOT(Na bis(ethylhexyl)sulphosuccinate ) in approximately 200 ml of solvent to form a second solution;

combining the first and the second solutions;

stirring the combined solutions for approximately 30 minutes; and

drop wise adding approximately 30% H2O2 until the stirred combined solution becomes yellow, and subsequently stirring for approximately 30 to approximately 60

minutes .

Claim 21. The method, as in claim 20, wherein instead of H2O2 , NaOH or NH4OH are added.

Claim 22. Surgical implants or dressings coated with an effective amount of nonagglomerated ultrafine engineered Cerium Oxide nanoparticles of the size approximately 2 to approximately 10 nm.